



Designation: D 4483 – 9903

Standard Practice for Determining Evaluating Precision for Test Method Standards in the Rubber and Carbon Black Manufacturing Industries¹

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INTRODUCTION

The primary precision standard for ASTM test method standards is Practice E 691; a generic standard that presents the fundamental statistical approach and calculation algorithms for evaluating repeatability and reproducibility precision. However, certain parts of Practice E 691 are not compatible with precision as evaluated in the rubber manufacturing and carbon black industries over the past four decades. Thus a separate standard is required for precision in these two industries. This practice is being issued as a major revision of Practice D 4483, which has been used for precision evaluation by Committee D11 since 1985. The basic Practice D 4483 precision calculation algorithms, the same as in Practice E 691, are unchanged. This new revised Practice D 4483, organized to accommodate the requirements of the rubber and carbon black manufacturing industries, has three new features that provide for a more formal and structured analysis of interlaboratory test program (ITP) data.

First it addresses the overriding issues with precision evaluation over the past several decades—the frequent discovery that reproducibility for many test methods is quite poor. Experience has shown that frequently poor reproducibility is caused by only a few laboratories that differ from the remainder that give good agreement. A new procedure designated as *robust analysis* provides an improved method for detecting outliers that cause poor precision, especially poor between laboratory agreement. Second, after outlier detection the new standard provides two options; (1) outlier deletion or (2) outlier replacement. When outliers are deleted the revised standard provides a way to retain the non-outlier laboratory data. This allows for a broader database for precision calculation. The current ASTM Committee E11 computer program for calculating precision does not allow for outlier deletion in this way. Third, when exercising outlier Option 2, the standard gives a procedure for calculating special replacement values for deleted outliers in ITPs that have only a few participating laboratories. The replacement values are obtained in a way that preserves the observed data distribution of the non-outlier data. This is important since many ITPs are in the *limited number of participating laboratories* category.

1. Scope

1.1 This practice presents guidelines for preparing clear, meaningful evaluating precision statements for test method standards under the jurisdiction of ASTM Committee D-11 on Rubber Testing and for ASTM Committee D-24 on Carbon Black Testing. It explains serves as the potential uses governing practice for standard test methods and gives the requirements for interlaboratory test programs needed in (ITP) used to evaluate precision formulation, the calculation algorithms for precision, and the format for expressing precision.

1.2 Test test methods are as used in many ways in technology. This broad usage requires careful consideration in assessing their general precision and, where pertinent, their accuracy. Clearly outlining the objectives rubber manufacturing and the carbon black industries. This practice uses the basic one way analysis of variance calculation algorithms of Practice E 691. Although bias is not evaluated in this practice, it is an essential concept in understanding precision evaluation.

1.2 This practice applies to test methods prior to the determination that have test results expressed in terms of a quantitative

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